CLAIMS

1. A ground contact load control apparatus for a vehicle comprising front and rear, left and right load bearing means for supporting the ground contact load of front and rear, left and right wheels, respectively; a load changing means which can operate to change the load supported by each of the load bearing means; a vehicle state sensing means which senses the state of the vehicle; and a control means which controls the operation of the load changing means in accordance with a signal from the vehicle state sensing means, characterized in that a load changing means which can increase or decrease the ground contact load of any pair of diagonally opposed wheels and the ground contact load of the other pair of diagonally opposed wheels in opposite directions from each other and which can increase or decrease the ground contact load of diagonally opposed wheels in the same direction is employed as the load changing means.

2. A ground contact load control apparatus for a vehicle as set forth in claim 1, characterized in that the front and rear, left and right load bearing means which support the ground contact loads of the front and rear, left and right wheels comprise front and rear, left and right suspension hydraulic cylinders each having a port and mounted on a corresponding one of the front and rear, left and right wheels, and the load changing means which can operate to change the ground contact load which is supported by each of the suspension hydraulic cylinders comprises ground contact load control hydraulic cylinders which receive the hydraulic pressure from each of the suspension hydraulic cylinders and operate based on the pressure difference, and an actuator which imparts an operating force to the ground

contact load control hydraulic cylinders.

3. A ground contact load control apparatus for a vehicle as set forth in claim 2, characterized in that a pitching control hydraulic cylinder which controls pitching of the vehicle body, a rolling control hydraulic cylinder which controls rolling of the vehicle body, and a heave control hydraulic cylinder which controls bouncing of the vehicle body are provided in a hydraulic circuit including each of the suspension hydraulic cylinders and the ground contact load control hydraulic cylinders.

4. A ground contact load control apparatus for a vehicle as set forth in claim 2, characterized in that an accumulator and a damping valve are provided for each suspension hydraulic cylinder.

5. A ground contact load control apparatus for a vehicle as set forth in claim 2, characterized in that a damping means and an elastic means are provided between the ground contact load control hydraulic cylinders and the actuator.

6. A ground contact load control apparatus for a vehicle as set forth in claim 2, characterized in that a releasing means is provided which can permit the ground contact load control hydraulic cylinders to freely move.

7. A ground contact load control apparatus for a vehicle as set forth in claim 2, characterized in that a securing means is provided which can disable the operation of the ground contact load control hydraulic cylinders.

8. A ground contact load control apparatus for a vehicle as set forth in claim 1, characterized in that the vehicle state sensing means comprises a tire pressure sensing means which senses the tire pressure of each of the front and rear, left and right wheels.

9. A ground contact load control apparatus for a vehicle as set forth in

claim 1, characterized in that the control means comprises an operating amount determining means which determines the operating amount of the load changing means in accordance with a signal from the vehicle state sensing means.

10. A ground contact load control apparatus for a vehicle as set forth in claim 1, characterized in that the control means comprises an operating speed determining means which determines the operating speed of the load changing means based on a signal from the vehicle state sensing means.

11. A ground contact load control apparatus for a vehicle as set forth in claim 10, characterized in that the vehicle state sensing means comprises a vehicle speed sensing means which senses the vehicle speed, and the operating speed determined by the operating speed determining means decreases as the vehicle speed sensed by the vehicle speed sensing means increases.

12. A ground contact load control apparatus for a vehicle as set forth in claim 10, characterized in that the vehicle state sensing means comprises a gear ratio obtaining means which obtains the gear ratio of a variable gear ratio steering mechanism, and the operating speed determined by the operating speed determining means decreases as the gear ratio obtained by the gear ratio obtaining means increases.

13. A ground contact load control apparatus for a vehicle as set forth in claim 1, characterized in that the control means comprises an allowing means which allows operating control by the load changing means when the vehicle speed is higher than a prescribed vehicle speed.

14. A ground contact load control apparatus for a vehicle as set forth in claim 2, characterized in that the control means comprises an initializing

means which, during travel straight ahead, initializes sensors which sense the operating state of the actuators.

15. A ground contact load control apparatus for a vehicle as set forth in claim 1, characterized in that the front and rear, left and right load bearing means which support the ground contact loads of the front and rear, left and right wheels comprise front and rear, left and right suspension hydraulic cylinders each having a single port and mounted on a corresponding one of the front and rear, left and right wheels, and the load changing means which can operate to change the ground contact load supported by the suspension hydraulic cylinders comprises a first ground contact load control hydraulic cylinder which receives the hydraulic pressure from each of the suspension hydraulic cylinders mounted on the left and right front wheels and is operated by the pressure difference, another ground contact load control hydraulic cylinder which receives the hydraulic pressure from each of the suspension hydraulic cylinders mounted on the left and right rear wheels and is operated by the pressure difference, an axial force ratio varying mechanism which can vary the ratio of the axial force acting on each piston rod of the ground contact load control hydraulic cylinders by changing the position of the support point of an arm connecting both piston rods, and an actuator which can change the position of the support point of the arm based on a signal from the vehicle state sensing means.

16. A ground contact load control apparatus for a vehicle as set forth in claim 1, characterized in that a road surface μ estimating means is provided which estimates the coefficient of friction of the road surface contacted by the left and right wheels at the time of braking, and a correcting means is provided which controls the operation of the load changing means based on

the coefficient of friction of each road surface obtained by the road surface μ estimating means and which increases the ground contact load of the front wheel on the high μ side and of the rear wheel on the low μ side and decreases the ground contact load of the front wheel on the low μ side and of the rear wheel on the high μ side.

17. A ground contact load control apparatus for a vehicle as set forth in claim 1, characterized in that the vehicle state sensing means comprises a vehicle speed sensing means which senses the vehicle speed and a steering angle sensor which senses the steering angle and a yaw rate sensor which senses the yaw rate, and the control means comprises a yaw rate estimating means which estimates a target yaw rate based on the vehicle speed sensed by the vehicle speed sensing means and the steering angle sensed by the steering angle sensor, a yaw rate comparing means which compares the target yaw rate estimated by the yaw rate estimating means and the actual yaw rate sensed by the yaw rate sensor, and an operation correction amount determining means which determines an operation correction amount of the load changing means based on the difference between the target yaw rate and the actual yaw rate.